

THE GENUS *HEXIDIONIS* (ACARINA, TROMBICULIDAE)  
WITH THE DESCRIPTION OF A NEW SPECIES  
FROM WESTERN MEXICO

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INTRODUCTION

Studies of chiggers taken in western Mexico have revealed a new species of chigger of the genus *Hexidionis* Vercammen-Grandjean and Loomis. Six other species belong to this genus: the type-species *Hexidionis jessiamae* (Gould), and five species previously assigned to the genus *Trombicula* Berlese. To facilitate the recognition of these seven species of *Hexidionis* we have provided a key to the larval stage.

In addition, we propose that *Pentidionis* Vercammen-Grandjean and Loomis, 1967, originally named as a subgenus of *Hexidionis*, be elevated to generic status. *Pentidionis* occurs in northern Africa and adjacent Asia; whereas, *Hexidionis* is known only from North America.

Grateful acknowledgment for helping to assemble these and other chiggers is extended to many individuals including: William J. Wrenn, Kenneth D. Peyton, W. Leon Hunter, Lynell K. Tanigoshi, James P. Webb, Jerry L. Fowler, Dean E. Harvey, and Dan B. Odenweller. We also wish to thank Elaine Katzer for her fine drawings.

The studies upon which this paper is based were supported by a research grant AI 03407 from the National Institute of Allergy and Infectious Diseases to California State College at Long Beach.

*Pentidionis* Vercammen-Grandjean and Loomis, *new status*

*Hexidionis* (*Pentidionis*) Vercammen-Grandjean and Loomis, 1967: 139-140.

*Type-species.*—*Thrombicula agamae* André, 1929.

*Included species.* — *Eutrombicula maura* Taufflieb, 1960, and *E. meridialis* Taufflieb, 1960.

*Remarks.* — Initially the genus *Hexidionis* was divided into two subgenera: *Hexidionis* from North America and *Pentidionis* from northern Africa and Asia Minor. Larvae of the species in the two subgenera share these characteristics: seven branched setae on the palpal tarsus; the presence of several internal bars in the distal leg segments; general shape of the scutum; the distal position of all tibialae

I and II, and tenent hairs on the claws. However, we believe that *Pentidionis* should be elevated to generic status, because of numerous differences, including those listed below:

1. The subterminala of the palpal tarsus is present in *Hexidionis* and absent in *Pentidionis*.
2. The parasubterminala I is absent in *Hexidionis* and present in *Pentidionis*. In *Hexidionis* a branched seta is near the subterminala, but it is not a parasubterminala.
3. The microtarsala II is proximal to tarsala II in *Hexidionis* but it is distal in *Pentidionis*.
4. Two of three gennalae I are distal in *Hexidionis*, but are proximal in *Pentidionis*.
5. Gennalae II and III are on the distal part of the segment in *Hexidionis*, but they are proximal in *Pentidionis*.

The similarity of *Hexidionis* and *Pentidionis* seems to be the result of convergence of larval characteristics apparently correlated with similar habitats and hosts. *Hexidionis lacerticola* (Loomis) of the southwestern deserts parasitizes American iguanids; whereas, the similar *Pentidionis agamae* (André) occurs in arid northern Africa and adjacent Asia on agamid lizards. The saurian families of Iguanidae and Agamidae are themselves classic examples of convergent evolution which appears to be repeated in these two genera of chiggers. *Pentidionis*, *Hexidionis*, *Toritrombicula* Sasa, and *Iguanacarus* Vercammen-Grandjean seem to belong to the same group. Species of *Toritrombicula* occur on circumtropical and subtropical birds, and *Iguanacarus* consists of three intranasal species of the Galapagos Marine Iguana. All of these genera have been found on hosts from arid habitats, and the present distribution of the latter two and possibly of all four genera may be the result of dispersal by marine birds.

#### *Hexidionis* Vercammen-Grandjean and Loomis

*Hexidionis* Vercammen-Grandjean and Loomis, 1967:139-140.

*Type-species.* — *Trombicula jessiema* Gould, 1956.

*Included species.* — *Trombicula allredi* Brennan and Beck, 1956; *T. breviseta* Loomis and Crossley, 1963; *T. doremi* Brennan and Beck, 1956; *T. lacerticola* Loomis, 1964; *T. polytechnica* Hoffmann, 1963 and *Hexidionis navojoe* new species.

*Diagnosis.* — Larva. Palpal tarsus with 7 B.S.; tarsus I without parasubterminala. See other characteristics under the genus *Pentidionis* and in the key to the species of *Hexidionis*.

*Hexidionis navojoae*, new species  
(Figure 1)

*Types*. — Holotype and 14 paratopotypes from 6 kilometers north of Navojoa, Sonora, México; host *Neotoma albigula*, original numbers RBL641203-18 (holotype and 7 paratopotypes), RBL641203-14 (2) RBL641203-15 (3), and RBL641203-16 (2); collected 3 December 1964 by R. B. Loomis and K. D. Peyton. The holotype and two paratopotypes will be deposited in the Rocky Mountain Laboratory, Hamilton, Montana. Paratopotypes now at California State College at Long Beach will be distributed to appropriate institutions and individuals.

*Diagnosis*. — Larva: Resembling *Hexidionis allredi* and *H. jessie-mae* in having 3 genualae I with dorsal genualae separated by greater distance than distance between distal genualae but differing in having two proximal tibialae longer than  $12\mu$  and in length of PL, 41-46 (see key to species).

*Description*. — Based on holotype, with differences noted among the paratopotypes, with all measurements in microns:

Body: Nearly round; color in life yellow; eyes 2/2, ocular plate indistinct.

Gnathosoma: Cheliceral base with posterior puncta; blade slender with tricuspid cap. Palpal setae B/B/BBB, tarsal setae 7 B.S., palpotibial claw trifurcate. Galeala with numerous branches.

Scutum: About one and one-half times as wide as long with puncta scattered on posterior two-thirds. Lateral margins sinuous; anterior margin perpendicular to lateral margin; posterior margin concave. Sensilla filiform with barbs on proximal half and distal half bearing 9 or 10 branches.

Scutal measurements of holotype, and (in parentheses) means, standard error ( $\pm 1$ ), and extremes of 15 types. AW, 56 (58,  $\pm 0.6$ , 55-63); PW, 61 (66,  $\pm 0.5$ , 61-71); SB, 22 (24,  $\pm 0.4$ , 21-26); ASB, 24 (24,  $\pm 0.4$ , 21-26); PSB, 19 (21,  $\pm 0.4$ , 17-23); AP, 16 (17,  $\pm 0.4$ , 15-18); AM, 31 (33,  $\pm 0.4$ , 30-36); AL, 28 (30,  $\pm 0.4$ , 27-34); PL, 41 (42,  $\pm 0.4$ , 41-46); S, 59 (60,  $\pm 1.19$ , 54-69).

Body setae (Figure 1): All body setae with many branches. Dorsal setal formula for holotype, 2 (humeral)-2-6-6-6-6-4-4-4 plus approximately 14 postanal setae; measurements of humeral seta 33, posthumeral seta 41, posterior dorsal seta 29. Ventral setae 2-2 plus approximately 31, measurements of sternal setae 42 and 41, small posterior seta 29. Total body setae approximately 90.

Legs: All coxae lightly punctate. Leg I with 3 genualae (11-13), microgenuala; 2 tibialae subequal (11-13), microtibialae; tarsala (13),

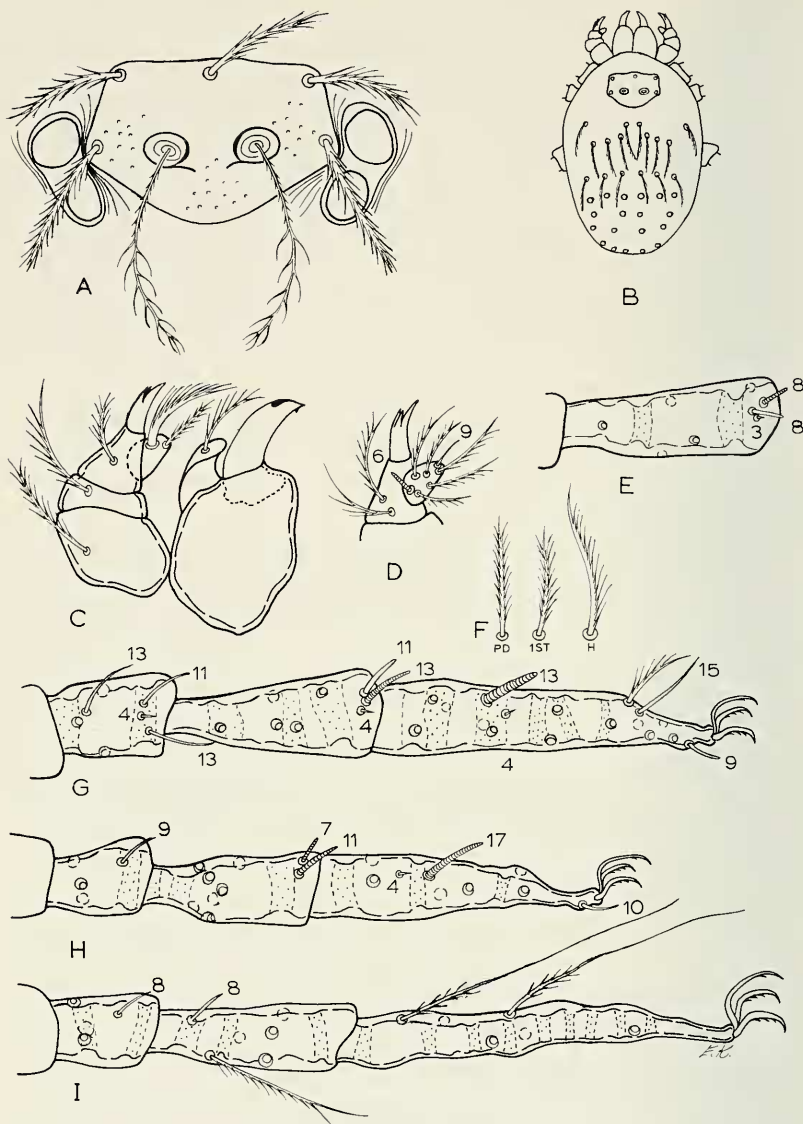


Figure 1. Selected features of the larvae of *Hexidionis navojoeae*, n. sp. and *H. allredi*. *Hexidionis navojoeae*, n. sp. (except Figure 1 E). A. Scutum and eyes. B. Dorsal aspect of body, showing arrangement of setae. C. Gnathosoma, dorsal aspect. D. Palpotibia and tarsus, ventral aspect. E. Tibia I of *Hexidionis allredi* (paratype). F. Body setae: posterior dorsal (PD), first sternal (1st), humeral (H). G. Leg. I, showing specialized setae with measurements in microns. H. Leg II, as above. I. Leg III, as above.

microtarsala, subterminala (15), pretarsala (9). Leg II with genuala (9); 2 tibialae (11-7); tarsala (17), microtarsala, pretarsala (10). Leg III with genuala (8); tibiala (8). All legs with internal bars in genu (2-3), tibia (3-4), tarsus (4-5). Each leg bearing two claws with 3 to 5 tenent hairs (onychotriches) and a clawlike empodium with one onychotrich. Leg index of holotype and (in parentheses) mean, standard error ( $\pm 1$ ) and extremes of 15 types: I, 320 (314,  $\pm 2.4$ , 282-338); II, 289, (278,  $\pm 4.1$ , 242-306); III, 315 (317,  $\pm 3.2$ , 291-338); total, 921 (909,  $\pm 10.9$ , 815-982).

*Remarks.* — This species closely resembles *H. allredi* but the latter has shorter tibialae (8-10), shorter PL's (less than 38), and the lateral palpotibial seta is nude or with few branches whereas it is heavily branched in *H. navojoae*. The anterior dorsal body setae are arranged as 2 (humeral), 2 (mid-dorsal), and 4 (first row) in *H. allredi*; whereas in *H. navojoae* the arrangement is 2 (humeral), 2 (mid-dorsal), and 6 (first row).

*Ecological notes.* — The type locality near Navojoa is in the arid thorn forest. Larvae of this species also were taken from rodents trapped in mixed thorn forest and short tree deciduous forest near El Novillo and in the Alamos area and from the Sonoran Desert near Hermosillo.

*Hexidionis allredi* and *H. navojoae* are sympatric, and both have been found together at almost all known localities of the latter species. They have been taken together on the same individual rodent 17 times in March, April and December. However, these two sympatric species show different seasons of larval activity since larvae of *H. navojoae* were taken from December to April, whereas *H. allredi* were found on hosts from March to December.

*Specimens examined.* — A total of 288 larvae in the Chigger Research Collection at California State College, Long Beach, including both *H. navojoae* and *H. allredi*, listed below (in parentheses) with the locality, host, and date of capture.

*Hexidionis navojoae* (108). MEXICO, SONORA: 6 km N Navojoa, 3 Dec. 1964, *Neotoma albigula* (24, including types), *Perognathus pernix* (4); 13 km SSE Alamos, *Peromyscus eremicus*, 9-10 April 1963 (12); 10-11 March 1963 (16), 27-28-29 March 1961 (38); 8 km W La Estrella (near El Novillo Dam), 7 April 1966, *Perognathus baileyi* (3); 10 km S Hermosillo, 2 Dec. 1964, *Perognathus penicillatus* (3), *Peromyscus eremicus* (5); 3 km S El Novillo Dam, 6 April 1966, *Peromyscus eremicus* (3).

*Hexidionis allredi* (180). UTAH, Washington Co., Rockville, 13 July 1953, *Neotoma lepida* (1 paratype). MEXICO, SONORA: 6 km



N Navojoa, 3 Dec. 1964, *Neotoma albigula* (16); 13 km SSE Alamos, 5 Aug. 1964, *Peromyscus eremicus* (8), *Perognathus artus* (9), *Lepus alleni* (4), *Neotoma albigula* (8); 9-10-11 April 1963, *Peromyscus eremicus* (9), *Perognathus artus* (6); 17 April 1962, *Peromyscus eremicus* (8), *Perognathus artus* (6), *Onychomys torridus* (9), *Neotoma albigula* (21), *Perognathus goldmani* (1), *Cnemidophorus costatus* (5), *Urosaurus ornatus* (2), *Sceloporus nelsoni* (5); 6 July 1960, *Peromyscus eremicus* (6), *Perognathus artus* (10), *Neotoma albigula* (5); 10 km S Hermosillo, 2 Dec. 1964, *Neotoma albigula* (20), *Peromyscus eremicus* (16); 3 km S El Novillo Dam, 13 July 1965, *Perognathus goldmani* (5).

#### KEY TO THE SPECIES OF *HEXIDIONIS*

The following key to the larvae includes the known distribution of each species.

The genus *Hexidionis* is characterized as a member of the tribe Trombiculini with flagelliform sensilla branched; scutum subpentagonal with large puncta; palpal tarsus with seven branched setae and subterminala; galeala branched; genualae I two or three; genualae II and III present; several distinct internal bars (4-5) in long tarsal segments; tarsal claws and empodia with tenent hairs (onychotriches); two mastitarsalae III nude or with basal barbs.

1. Two genualae I; tarsala II with knob, (Calif., Ariz., Nevada, Baja Calif., Sonora to Hidalgo, México) on lizards . . . . . *H. lacerticola*
1. Three genualae I, tarsala II without knob . . . . . 2
2. Distance between dorsal genualae I < between distal dorsal and lateral genualae I . . . . . 3
2. Distance between dorsal genualae I > between distal dorsal and lateral genualae I . . . . . 5
3. Dorsal palpotibial seta nude; total leg measurements less than 1200  $\mu$  . . . . . 4
3. Dorsal palpotibial seta branched; total leg measurements greater than 1200  $\mu$  (México) . . . . . *H. polytechnica*
4. Dorsal body setae long (21-24  $\mu$ ) slightly expanded and flattened; PL greater than 25  $\mu$  (Utah, Mojave and Sonoran Deserts of U.S. and northwestern México) . . . . . *H. doremi*
4. Dorsal body setae short (14-18  $\mu$ ) greatly expanded and flattened; PL less than 20  $\mu$  (Texas, Coahuila and northeastern Sonora, México) . . . . . *H. breviseta*
5. Tarsus I longer than 100  $\mu$ ; AM longer than 45  $\mu$ ; AL longer than 40  $\mu$ ; PL longer than 50  $\mu$  (Mojave and Sonoran Deserts) . . . . . *H. jessiema*

5. Tarsus I shorter than  $100\mu$  ; AM shorter than  $35\mu$  ; AL shorter than  $40\mu$  ; PL shorter than  $50\mu$  ..... 6
6. Tibialae I shorter than  $10\mu$  , dorsal setal formula beginning 2 (humeral)-2-4, PL shorter than  $40\mu$  , (Utah, Calif., to Sonora, México) ..... *H. allredi*
6. Tibialae I longer than  $11\mu$  , dorsal setal formula beginning 2 (humeral)-2-6, PL longer than  $40\mu$  , (central and southern Sonora, México) ..... *H. navojoae* n. sp.

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Accepted for publication September 6, 1968.